Applicants have invented apparatus and a method for estimating the intensities of picture elements (pels) by motion compensated interpolation. Interpolation is an averaging process, which permits the intensity value of a non-transmitted picture element to be reconstructed or estimated using intensity values associated with transmitted picture elements at appropriate locations in two versions of the picture which temporally "bracket" the picture being processed. Unlike prior art interpolative coders in which information from these other versions was obtained at the same spatial location as the present pel, applicants' invention takes account of the displacement or movement of objects in the picture which occur during the time interval between the previous and succeeding versions. This permits much more accurate reconstruction of non-transmitted intensity information and, in turn, permits encoding of transmitted frames using an advantageously reduced bit rate.

Netravali et al patent 4,218,703 relates to a recursive technique for estimating the displacement and/or velocity of objects in video scenes. The technique uses information derived from a previous frame as well as the present frame, in accordance with (for example) equation (10) in column 4, but "future" information from a succeeding frame is not involved. While an interpolator 307 of FIG. 3 is used to form intermediate values needed in the displacement estimate computation, inspection of that figure and the associated portions of the specification clearly reveals that an intensity value is not being interpolated from preceding and succeeding versions of the picture.

Concurrently filed Netravali et al patent 4,218,704 teaches the use of the aforedescribed displacement estimation technique in a motion compensated predictive encoder. In particular, intensity values associated with pels in a previous frame stored in frame memory 102 of FIG. 1 are accessed in accordance with a displacement value applied via quantizer 105. Stored intensity values within the prior frame are interpolated in interpolator 151 to yield the predicted value P, and in
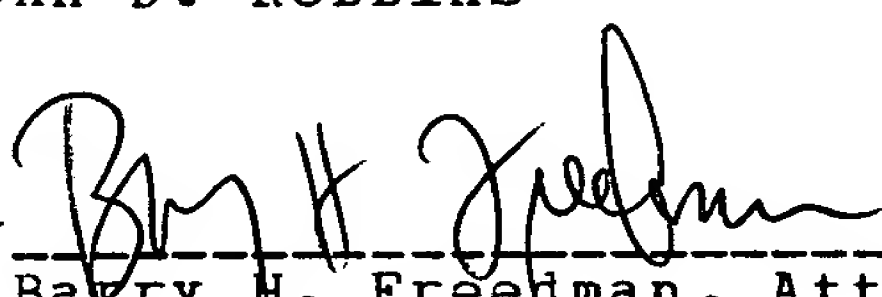
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interpolator 107 to yield terms needed to compute the displacement update term. In no case is interpolation used or suggested in order to reconstruct a picture element intensity value using previous and succeeding versions of the picture.

Patent 4,232,338 issued to Netravali et al on November 4, 1980 extends the predictive encoding technique just described to an adaptive or switched predictor system wherein motion compensated prediction is used only when it is advantageous, and ordinary frame difference prediction is used otherwise. Interpolation is again used, but only in the same context as previously described with respect to patent 4,218,704.

In summary, it is submitted that the cited Netravali et al references pertain to recursive estimation of displacement in a series of pictures and its use in predictive encoding of the present picture version. Such predictive encoding uses information only from preceding picture versions. No suggestion is made of recovering a non-transmitted picture from both previous and succeeding versions, as is necessarily performed during interpolation in accordance with the present invention. Accordingly, reconsideration and allowance of claims 1-24 is earnestly solicited.

Respectfully submitted,

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